

We claim:

## CLAIMS

1    1. A method of estimating a channel in a communication system, the method  
2 comprising:

3                 receiving a block of "n" transmitted symbols, the symbols including pilot  
4                 symbols and "d" data symbols;

5                 estimating a channel using the pilot symbols to create a channel estimate;  
6                 choosing a group of "m" strongest symbols from the "d" received data

7                 symbols;

8                 compensating the group of "m" strongest symbols using the channel estimate to  
9                 create a group of "m" compensated symbols;

10                re-estimating the channel using the group of "m" compensated symbols and pilot  
11                symbols; and either:

12                repeating the steps of choosing the group of "m" strongest symbols,

13                compensating the group of "m" strongest symbols and re-estimating the channel,

14                or

15                using a latest channel estimate to compensate all symbols within the  
16                block.

1    2. The method of claim 1, wherein the communication system is an OFDM  
2                 communication system.

1    3. The method of claim 1, wherein "m" is less than "d".

1    4. The method of claim 1, wherein "m" equals "d".

1    5. The method of claim 1, wherein the communication system is associated with a  
2                 multi-antenna receiver.

1       6.     A method of estimating a channel in a communication system, the method  
2     comprising:

3             receiving a block of "n" transmitted symbols, the symbols including pilot  
4     symbols and "d" data symbols;

5             estimating a channel using the pilot symbols to create a channel estimate;  
6             choosing a group of "m" strongest symbols from the "d" received data  
7     symbols;

8             compensating the group of "m" strongest symbols using the channel estimate to  
9     create a group of "m" compensated symbols;

10            re-estimating the channel using the group of "m" compensated symbols and pilot  
11     symbols; and either:

12              choosing a group of "x" strongest symbols, compensating the group of  
13     "x" strongest symbols and re-estimating the channel, or

14              using a latest channel estimate to compensate all symbols within the  
15     block.

1       7.     The method of claim 6, wherein "m" is less than "d".

1       8.     The method of claim 7, wherein "x" is less than "m".

1       9.     The method of claim 6, wherein "x" is greater than "m".

1       10.    The method of claim 6, wherein "d" equals "m" and "m" equals "x".

1       11.    The method of claim 6, wherein the communication system is associated with an  
2     OFDM protocol.

1       12.    The method of claim 6, wherein the communication system is associated with a  
2     multiple antenna receiver.

1       13.    A method of estimating a channel in a wireless receiver, the method comprising:  
2             receiving a block of "n" transmitted symbols, the block including pilot symbols  
3     and "d" data symbols;

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4 estimating a wireless channel using the pilot symbols to create a channel estimate;  
5 choosing a group of "m" strongest data symbols from the "d" received data  
6 symbols;

7 compensating the group of "m" strongest symbols using the channel estimate to  
8 create a group of "m" compensated symbols;

9 re-estimating the wireless channel using the group of "m" compensated symbols  
10 and pilot symbols; and

11 either:

12 repeating the steps of choosing the group of "x" strongest symbols,  
13 compensating the group of "x" strongest symbols and re-estimating the channel  
14 at least once, or

15 using a latest channel estimate to compensate all data symbols within the  
16 block.

1 14. The method of claim 13, wherein "m" equals "x".

1 15. The method of claim 13, wherein "x" is less than "m".

1 16. The method of claim 13, wherein "m" equals "d".

1 17. The method of claim 13, wherein if the steps of choosing a group of "x"  
2 strongest symbols, compensating the group of "x" strongest symbols and re-estimating  
3 the channel at least once are repeated, the steps are repeated a plurality of times.

1 18. A method of estimating a channel in a communication system, the method  
2 comprising:

3 receiving a block of symbols;

4 estimating a channel using at least one of the symbols;

5 choosing a group of symbols from the received symbols;

6 compensating the group of symbols using the channel estimate; and

7 re-estimating the channel using the group of compensated symbols and the at  
8 least one of the symbols.

1 19. The method of claim 18, further comprising either:

2 repeating the steps of choosing a group of symbols, compensating the group of  
3 symbols and re-estimating the channel, or

4 using a latest channel estimate to compensate all symbols within the block.

1 20. The method of claim 18, wherein the at least one of the symbols is a pilot  
2 symbol.

1 21. The method of claim 18, wherein the group of symbols chosen is chosen based  
2 on signal strength.

1 22. The method of claim 21, wherein the signal strength of the symbols chosen in  
2 the group is associated with a predetermined criteria.

- 1    23. A method of estimating a channel in a wireless receiver, the method comprising:
  - 2        receiving a block of “n” transmitted symbols, the block including pilot symbols
  - 3        and “d” data symbols;
  - 4        estimating a wireless channel using the pilot symbols to create a channel estimate
  - 5        choosing a group of “m” strongest data symbols from the “d” received data
  - 6        symbols;

7 compensating the group of “m” strongest symbols using the channel estimate to  
8 create a group of “m” compensated symbols;

9 re-estimating the wireless channel using the group of "m" compensated symbols  
10 and pilot symbols;

11 determining whether a number of iterations is equal to or greater than T; and  
12 if the number is less than T:

13 choosing “x” strongest symbols

compensating the “x” strongest symbols; and

15                   repeating the method continuing at the step of re-estimating the channel  
16                   using the “x” compensated symbols and the pilot symbols; and  
17                   if the number is equal to or greater than T:

18                   using a latest channel estimate to compensate all data symbols within the  
19                   block.

1     24.    A method of estimating a channel in a wireless receiver according to claim 23,  
2    further comprising:

3                   if “x” is equal to or greater than “m”:

4                   setting “m” equal to “x”; and

5                   repeating the method from the step of choosing a group of “m” strongest  
6                   symbols from the “d” received data symbols; and

7                   if “x” is less than “m”, continuing the method at the step of choosing “x”  
8                   strongest symbols.

1     25.    A system for performing channel estimation associated with a wireless  
2    communication system, the wireless communication system receiving a block of symbols  
3    including pilot symbols and data symbols, the channel estimation system comprising:

4                   a symbol selector;

5                   an initial channel estimator;

6                   a symbol compensator; and

7                   a channel estimator, wherein the initial channel estimator produces an initial  
8                   channel estimate using the pilot symbols and the symbol selector chooses a group of “m”  
9                   strongest data symbols, and wherein the “m” strongest data symbols are compensated  
10                  using the initial channel estimate and the channel estimator re-estimates the channel  
11                  using the compensated symbols and the pilot symbols.

1     26.    A method of recovering data symbols from a plurality of data sequences using a  
2    symbol selector and a symbol compensator, the method comprising:

3 receiving the plurality of data sequences at the symbol selector;  
4 choosing a strongest data sequence from the plurality of data sequences;  
5 choosing "m" strongest data symbols from the strongest data sequence;  
6 choosing "m" data symbols at the same frequency tone positions in at least one  
7 unchosen data sequence of the plurality of data sequences; and  
8 recovering original symbols from the plurality of data sequences using the "m"  
9 strongest data symbols from the strongest sequence and the "m" data symbols from the  
10 at least one unchosen data sequence.

1 27. The method of claim 26, wherein the strongest data sequence is chosen  
2 according to a signal strength of each of the plurality of sequences.

1 28. A method of choosing data symbols to transmit to a symbol compensator, the  
2 method comprising:  
3 receiving a plurality of data sequences at a symbol selector;  
4 choosing a strongest data sequence from the plurality of data sequences;  
5 choosing "m" strongest data symbols from the strongest data sequence;  
6 choosing "m" data symbols at the same frequency tone positions in at least one  
7 unchosen data sequence of the plurality of data sequences; and  
8 transmitting the "m" strongest data symbols from the strongest data sequence  
9 and the "m" data symbols from the at least one unchosen data sequence to the symbol  
10 compensator.